

BOOK REVIEWS

LEHRBUCH DER PFLANZENPHYSIOLOGIE, durch H. Mohr und P. Schopfer, mit xi, 608 Seiten, 639 Abb., und 35 Tab. 3., völlig Neubearb. und erw. Aufl. ISBN 3-540-08739-7. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Gebunden DM 78, US \$39.00. (with pp. xi + 608, 639 figures and 35 tables. 3rd revised and enlarged edition. ISBN 3-540-08739-7. Berlin, Heidelberg, New York: Springer-Verlag, 1978. Cloth DM 78, US \$39.00).

Hans Mohr is a respected German scientist known not only for his research in the field of photomorphogenesis but also for his writings. His books include: *Lectures on Photomorphogenesis* (1972), *Lectures on Structure and Significance of Science* (1977) as well as the predecessor of the volume under review, namely *Lehrbuch der Pflanzenphysiologie* (1969; all published by Springer-Verlag). His latest work, in co-authorship with Peter Schopfer, also of the University of Freiburg, costs about 70 % more than did the first edition, so naturally one is interested to know whether, in addition to inflation in the publication industry, this steep price rise might also reflect an increase in scientific content.

Indeed, this attractively-produced book is one-third more voluminous and contains twice as many figures as the first edition. And, I am happy to add, it is a solid, comprehensive text, the kind that should give both teacher and student a framework of conceptual synthesis and integration of the subject of plant physiology. There are 49 chapters which cover the spectrum of plant physiology. As may be expected photomorphogenesis is given strong emphasis but without creating an imbalance as far as other developmental aspects are concerned. The subject matter, based on the curriculum as taught at Freiburg, is innovative, and important and often neglected areas of textbook plant physiology such as for example intracellular morphogenesis, allelochemic reactions, nuclear-cytoplasmic interactions, C_4 /CAM photosynthesis, effects of UV light, rhythms and movements are treated with authority and clarity if in some cases with brevity. With reference to the latter, I refer specifically to cellular recognition systems in plants in conjunction with the role of lectins as well as to the biochemical functions of the higher plant vacuole.

This text is intended for undergraduates but (like *Botany: An Introduction to Plant Biology* by Weier, Stocking and Barbour—John Wiley—which is intended for 1st year students) it is used by post-B.Sc. and doctoral students in preparation for examinations, as well as by teachers as source material. The author citation is substantial and as is usual in a German text the index is detailed.

This text most certainly applies to the teaching and study of plant physiology in southern Africa but unfortunately its usefulness will be limited since few students could be expected to command enough scientific German to warrant its purchase. I see its use as a reference work for teachers of the subject and would hope that an English translation will become available. This should be done as soon as is possible to avoid dating of the information.

There has been a tendency over the past 20 years to assign a number of small texts on specialized plant physiological topics for student course work. In part, this became necessary because of the absence of comprehensive, all-encompassing texts (with few exceptions) in the style of the classic *Introduction to Plant Physiology* by Meyer, Anderson and Böhnig; in part, also, because of the feeling that with an ever-expanding subject such as plant physiology a comprehensive text is outdated by the time it lands on the bookseller's shelf. However, plant physiology in recent years has become the junction through which

biochemists and ecologists communicate with each other. *Lehrbuch der Pflanzenphysiologie* also succeeds in putting this aspect into perspective.

CHRIS H. BORNMAN

PLANT HORMONES AND PLANT DEVELOPMENT, by W. P. Jacobs. ISBN 0-521-22062-9. Cambridge: Cambridge University Press, 1979. UK £18.00.

W. P. Jacobs is professor of Biology at Princeton University and one of the pioneers of abscission research. Much of his work on plant hormone-related aspects of abscission has its basis in physioanatomy with the result that his interpretation of functional phenomena are always closely linked to the structural. This, coupled with the fact that he has worked with four major groups of plant hormones, has allowed Jacobs to perceive events in plant growth and development more successfully from the organismal, holistic point of view than those who, for example, have pursued in depth the biochemical and physiological effects of but one or at most two hormones.

This book, intended for advanced under-graduate as well as post-graduate students, consequently reflects a rich and varied experience with all the plant hormones except ethylene, and if—as the author himself readily admits—it lacks the detailed depth of a life-time's activities with one hormone, it succeeds in providing balance and synthesis of the role of four of the five groups of hormones that in one way or another control and co-ordinate plant growth and development.

Since the author also holds the philosophy that it is just as important to describe the development of research ideas as it is to describe the development of plants, students of hormone physiology will find his critical analysis of some of the hundreds of experiments (ca. 900 references are cited) under review a startling reminder of how essential it is that scientific research be well planned.

A large part of the book is devoted to the auxins. The gibberellins are mainly reviewed in conjunction with the "flowering hormones" but, with the cytokinins and abscisic acid, are critically appraised. Of the 11 chapters, the two dealing with movement and roots are of particular interest, especially the latter since in the author's view root development is one of the research areas of greatest importance in our current state of ignorance. The last chapter is an overview in which the author assesses the present status of plant hormone knowledge from the organismal point of view, lending flavour with cryptic interpretations to the results of many of the well-known experiments.

The major weakness of this book is in relation to ethylene. It is barely mentioned. Could it be that the author does not share the view that this ubiquitous gas with its profound physiological and biochemical effects qualifies it as a plant hormone in the classical sense? Or does its absence simply reflect the fact that it was not part of the stable of plant growth regulators upon which Jacobs and co-workers focused their attention? I assume, since this book is based more on personal than collective experience, that it is the latter.

CHRIS H. BORNMAN

BIOCHEMISTRY AND PHYSIOLOGY OF PLANT HORMONES, by T. C. Moore, with pp. xii + 274, 164 figures and 13 tables. ISBN 3-540-90401-8 (Berlin, Heidelberg), ISBN 0-387-90401-8 (New York). Berlin, Heidelberg, New York: Springer-Verlag, 1979. Cloth DM 49, approx. US \$27.00, UK £12.15.

Most students interested in and working on problems related to plant growth regulators will welcome the appearance of this book. It is written by someone who not only himself has been intensively involved in plant hormone research (auxins and gibberellins), but who also has had considerable experience in teaching this aspect of plant physiology

to post-graduate students. In fact, I suspect this book is based on lecture material used in theoretical and practical courses in plant hormone physiology.

The book consists of 7 chapters, 5 of which are devoted to the five major groups of plant hormones, namely auxins, gibberellins, cytokinins, abscisic acid and ethylene. The first chapter introduces terminology and concepts, gives a review of the phenomenon of growth and the mechanisms that control cellular differentiation, and hints at the regulatory role of plant hormones in growth and development. The seventh and last chapter deals not with a hormone, but with the pigment phytochrome. Phytochrome is also very intimately involved in the control of a plant's growth and developmental history and as there are a number of critical interactions between this pigment system with hormone metabolism and action, it is not illogical to explore the connection.

The chapters on the various hormones provide interesting facts on their discoveries, occurrences, chemical characteristics, physiological and biochemical effects, synthesis, metabolism and modes of action, etc. The book as a whole provides basic information in a logical and stepwise fashion that cannot but aid the student in developing an integrated understanding of this complex (in the words of the misinformed: "mixed up") field of plant physiology.

Students of botany and of its applied fields such as crop science, horticulture, pasture science, and forestry should find this clearly and concisely written treatise very useful.

CHRIS H. BORNMAN

ORGANIZATION IN PLANTS, by W. M. M. Baron, with pp. iii + 264, 163 figures and 25 tables. 3rd edition. ISBN 0-7131-2643-A. London: Edward Arnold, 1979. Paper R16.90.

This third edition succeeds the fourth reprint of the previous edition and has been extensively modified, updated and adapted to particularly emphasize the whole plant in relation to its surroundings. In the author's own words the main aim was to: "bring out ways in which the plant interacts with its environment and so is able to compete successfully with its neighbours". At a time when progressively more emphasis is being placed on the ecophysiological approach to plant growth, the author has admirably succeeded in integrating growth and development with the plant's surroundings.

The text is directed at the introductory courses to a study of plant physiology and consequently aims to explain the various processes in plants in an easily comprehensible way. Structure is skilfully integrated with function.

A very useful feature of this book is the frequent reference to experimental procedures to back up the more theoretical discussions. This serves to emphasize the experimental nature of plant physiology and stimulates the reader to critical thought. In an appendix 64 experiments are grouped together to supplement the different chapters. Description of experiments are concise and directly related to the text.

In eight chapters cell organization, water relations, photosynthesis, respiration, mineral nutrition, biochemistry of cell activities, co-ordination in the plant and the physiological organization and life cycle of plants are profusely illustrated by graphs, electron micrographs, photographs and line drawings eliciting the text even further.

J. H. VISSER

PERSPECTIVES IN GRASSLAND ECOLOGY, edited by Norman French, with pp. 204 + xi, 60 figures and 47 tables. Volume 32 in the series "Ecological Studies". Berlin, Heidelberg, New York: Springer-Verlag, 1979. DM 54.

The book is bound neatly in a hard cover of 165 × 240 mm in size. Good quality paper is used and the letter printing is of a high standard. Different type sizes have been em-

ployed without creating an imbalanced effect. Italics have been used for the scientific names and mathematical formulae.

A list of contributors responsible for the text, as well as their present addresses is given in the preliminary pages of the book. Each chapter contains an introduction, methods of analysis, results, summary and a list of references. A particularly valuable feature is the adequate lists of references to literature, much of which may not be familiar to every grassland ecologist.

The purpose of this book is to present a summary of quantitative ecological investigation of North American grasslands and to present a set of broad comparisons of their characteristics and functions as well as the results of some models and experiments that lead to practical considerations of the management of grasslands.

Following the introduction, in which the types and general characteristics of North American grasslands are presented, there are ten chapters which focus on general categories of grassland ecosystem studies:

- (i) primary production and factors controlling it,
- (ii) the effects of aboveground and belowground consumers in the grassland ecosystems,
- (iii) nutrient cycling and the application of simulation modelling in grasslands and
- (iv) the most important subsystem interactions in grasslands.

In this book the current concepts of grassland ecosystem structure and function are clearly presented and could also be applicable to South African conditions.

The illustrative matter is of a good quality, accurately presented and relevant to the text. The subject index at the back of the book is comprehensive and detailed but unfortunately an author index is not presented.

This well-produced book is highly recommended for botanists and pastoralists interested in grassland ecosystem ecology from both teaching and research points of view.

W. L. J. VAN RENSBURG

THE *ALOINEAE*, A BIOSYSTEMATIC SURVEY, by H. P. Riley and S. K. Majumdar, with pp. x + 180, illustrations. ISBN 0-8131-1376-8. University Press of Kentucky, 1979. R28,75.

The book is a scholarly treatment of the biosystematics of the *Aloineae* which can certainly be recommended to those with a research interest in the tribe, and to some extent to students of biosystematics in general.

Apart from short sections on chromatography, ultrastructure and related studies, the book is essentially concerned with chromosomes. Given that the lesson of the chromosomal constancy of the tribe may well be that ecological factors are probably of major importance in the maintenance of species integrity, it is therefore unfortunate that, for example, flowering time as an isolation mechanism does not find a mention. Moreover, given that a work of this size is devoted primarily to the chromosome cytology of an extremely uniform group it is perhaps predictable that much of the work is a description of the historical development of the subject, which detracts from the elements of dynamism and synthesis to be hoped for in a book promising such a modern approach. The result is that certain sections are boring; and the same can be said of the chapter on species distribution which, although very complete, becomes unreadable to the point of absurdity as the authors introduce into the text long lists of species names which probably mean little to most readers and could have far better been tabulated.

One might have hoped, for instance, that some definite indication be provided of the genetical significance of the bimodal karyotype; its possible function as the provision of two recombination systems is hinted at, but never firmly asserted. Similarly, a work of this size could have described the inter-tribal linkages provided by the bimodal karyotype, an important and interesting field which Darlington found time for in his much more general *Chromosome Botany*.

The book is well produced and free of errors, though "self-pollination" on p. 146 should presumably read "cross-pollination". The use of photographs and idiograms rather than camera lucida drawings is to be commended, though one wishes that chromosomes in idiograms could be provided with straight sides (Fig. 4.4) and that translocations, where they are illustrated by photographs, be indicated by arrows where not immediately obvious (Fig. 9.2).

The book is a valuable reference work, and the detailed descriptions of certain aspects of cytology, such as E-type bridges, make informative reading even to accomplished cytologists. It is strange, however, that chromosome banding is not thought worthy of mention. Admittedly, few such studies have been made in the *Aloineae*, but the authors' own illustration of cold-sensitive segments in *Haworthia* point to their likely importance.

The book will have succeeded if it helps point the way to a new breed of biosystematic treatments based on the precept that, where chromosomal differences can be detected, they constitute a firm indication of whether two taxa interbreed and therefore, in the evolutionary sense, constitute separate species. As such, the book is both encouraging and stimulating; encouraging by virtue of championing the role of cytotaxonomy to a taxonomic audience to which it is still constantly necessary to argue the value of chromosomes, and stimulating by virtue of reminding us of the vast potential for cytotaxonomy existing at our doorstep. The book serves to emphasise the continued reliance of South African cytotaxonomy on the occasional visits of overseas experts, but by doing so it may perhaps serve a corrective role.

D. J. MOGFORD

SCANNING ELECTRON MICROSCOPE STUDIES OF THE LEAF EPIDERMIS IN SOME SUCCULENTS, by D. F. Cutler and Heidrun Hartman, with pp. 50 + iv, 15 plates (77 photographs) and 18 references. Wiesbaden: Franz Steiner Verlag GmbH, 1979. DM 17.80.

The booklet represents pages 447–497 of vol. 28 of "Tropische und subtropische Pflanzenwelt" which is edited by W. Rauh. It contains two chapters. The first by Cutler is entitled: "Leaf surface studies in *Aloe* and *Haworthia* species (Liliaceae): Taxonomic implications". It deals with sixteen *Haworthia* and eleven *Aloe* species.

Although the descriptions that are provided were derived from only one specimen of each species, the author is convinced that . . . "it is highly probable that they (the descriptions) will be accurate in most respects for other samples" because it has been established that the characteristics that are described are under strong genetic control. The specimens that were studied were all from the research collection at Kew.

In general, it was found that M. B. Bayer's recent revision of *Haworthia* is well supported at the subgeneric level by the results. The very small number of *Aloe* species that were examined severely restricts the taxonomic value of the work on this genus.

In the second chapter of the booklet, Hartman deals with "Surface structures of leaves: their ecological and taxonomical significance in members of the subfamily Ruschioideae Schw. (Mesembryanthemaceae Fenzl)".

Most of the material that was examined was collected by the author during two excursions to South Africa. Fifty-four species (*Cheiridopsis*, 10; *Cephalophyllum*, 18; *Fenestraria*, 1; *Leipoldtia*, 7; *Octopoma*, 6; *Ottosonderia*, 1; *Schlechteranthus*, 2; and *Vanzijlia*, 1) were examined. The sections were air-dried as it was found that drying by the critical point method results in the dissolution of the epicuticular wax layers. In this respect the leaves of members of the Ruschioideae appear to differ from those of species of *Aloe* and the Mesembryanthemoideae.

Although the English of the second chapter could have been improved somewhat, both chapters are written in a concise but clear way. The main appeal of the work will undoubtedly be its many illustrations which in most cases were prepared with the help of

a scanning electron microscope. The booklet should be of value mainly to researchers and post-graduate students of morphology and taxonomy.

N. GROBBELAAR

DIE INFLORESZENZEN DER HYDROCOTYLOIDEEN (APIACEAE), deur Hans A. Broebe, met pp. 181 en 57 figure. Wiesbaden: Franz Steiner Verlag GmbH (Tropische und subtropische Pflanzenwelt, 29). DM 71,80.

Volgens Engler & Prantl (*Planzenfam.* 1898) is die Hydrocotyloideae 'n subfamilie van die familie Umbelliferae. Hieruit is dit duidelik dat die werk van Froebe wat oor die bloeiwyses van verteenwoordigers van 37 genusse van die Hydrocotyloideae handel 'n gespesialiseerde publikasie is wat hoofsaaklik op navorsingswerkers en nagraadse studente toegespits is. Vir planttaksonomie en morfoloë is die werk van groot belang aangesien die outeur nie alleen daarin slaag om verskillende tipes bloeiwyses in die groep te identifiseer en beskryf nie maar slaag hy ook daarin om interessante filogenetiese reekse waar te neem. Interessant hier is ook die feit dat die outeur die terminologie wat Troll en Weberling vir bloeiwyses voorgestel het, gebruik het aangesien die terminologie nie algemeen gebruik word nie.

In die teks word die bloeiwyses van 37 genusse beskryf en deur middel van 57 figure pragtig geïllustreer. Vier van die 37 genusse word in Suidelike Afrika verteenwoordig. Die figure behels nie alleen sketse van die bloeiwyses nie maar ook skematiese voorstellings en grondplanne daarvan. Die feit dat die outeur deurgaans van gestandaardiseerde simbole gebruik maak vergemaklik die interpretering van die figure en lei ook daartoe dat bloeiwyses van verskillende spesies maklik vergelyk kan word.

Van die 37 genusse onder bespreking is feitlik alle spesies bestudeer. Aan die einde van die teks word 'n lys van alle bestudeerde eksemplare met die name van die versamelaars asook die name van die herbariums waar die eksemplare geberg word voorsien. Ook word 'n lys van geldige en ongeldige name gegee wat moontlike verwarring uit-skakel.

Die publikasie wat in Q1 formaat op duursame glanspapier gedruk is, kan voorwaar vir navorsers op hierdie gebied aanbeveel word.

W. F. REYNEKE

CUTICULAR-TAXONOMIE DER GRÄSER EINES WEST-AFRIKANISCHEN SAVANNEN GEBIETES UNTER DEM ASPEKT DER FUTTERPRÄFERENZ-ANALYSE WILDLIEBENDER GROBSAUGER, deur Wilhelm Barthlott en Brigitta Martens, met pp. 113 en 71 figure. Wiesbaden: Franz Steiner Verlag GmbH (Tropische und subtropische Pflanzenwelt 30, 1979). DM 38.

Hierdie publikasie handel in hoofsaak oor die bou van die blaarepidermis van 40 grasspesies, wat in 25 genusse ressorteer, wat in die Camoé Nasionale Park (Noordelike Ivoorkus) voorkom.

In die twee inleidende hoofstukke word die agtergrond waarteen die navorsing onderneem is en 'n beskrywing van die plantegroei van die gebied gegee. Daarna volg 'n volledige bespreking van die metodes en terminologie wat gebruik is. Aangesien daar min van die bestaande terminologie afgewyk word, behoort die leser min moeite met die interpretering van die teks en figure te onervind.

'n Sleutel waarvolgens die ondersoekte spesies van mekaar onderskei kan word, word voorsien. Slegs twee spesies van die genus *Loudetia* en twee van die genus *Andropogon* kan nie van mekaar onderskei word nie. Die beskrywings van die epidermis van die spesies is in telegramstyl en die aandag is hoofsaaklik op die abaksiale epidermis toegespits. Die beskrywings gaan in die meeste gevalle gepaard met lyntekeninge wat deurgaans op

die bladsy teenoor die beskrywing voorkom en dus die rondblaaï op soek na figure uit-skakel. In enkele gevalle word ook van fotomikrograwe gebruik gemaak terwyl daar ook ses aftaselektronmikrograwe verskyn.

Alhoewel die outeurs vermeld dat die verskillende soorte op verskillende tye van die jaar en in verskillende habitatte ondersoek is, bestaan daar onduidelikheid in verband met die metodes waarvolgens die variasie binne 'n soort bestudeer is. Die outeurs kom dan ook tot die ietwat vreemde gevolgtrekking dat die variasie binne 'n spesie primêr afhanklik is en beïnvloed word deur lugvogtigheid en dat die variasie as gevolg van die habitat minimaal is en nie die identifisering van die soorte beïnvloed nie.

Slegs tien van die ondersoekte spesies word in Suidelike Afrika aangetref en om dié rede sal die publikasie 'n beperkte gebruik in Suid-Afrika ondervind. Die publikasie lewer egter 'n betekenisvolle bydrae tot die kennis van die bou van die epidermis van grasse oor die algemeen en sal dus met vrug deur navorsers gebruik kan word.

Die publikasie is in Q1 formaat op duursame glanspapier gedruk en die tekeninge, fotomikrograwe en aftaselektronmikrograwe is van besonder hoë standaard.

P. D. F. Kok

BROMELIENSTUDIEN: 1. NEUE UND WENIG BEKANNTE ARTEN AUS PERU UND ANDEREN LÄNDERN, deur Werner Rauh, met pp. 29 en 15 figure. Wiesbaden: Franz Steiner Verlag GmbH (Tropische und subtropische Pflanzenwelt 31, 1979). DM 10,60.

Soos die subtitel van die publikasie aandui word in die teks nuwe en skaars taksons in die familie Bromeliaceae beskryf. Die betrokke taksons ressorteer onder vier genusse naamlik *Tillandsia*, *Gusmania*, *Fosterella* en *Vriesea*. In eersgenoemde genus word drie nuwe spesies en een variëteit beskryf terwyl na een skaars spesie verwys word. In die genus *Gusmania* word een nuwe spesie en een variëteit en in laasgenoemde twee genusse elk een spesie beskryf. Met die uitsondering van twee van die nuut beskryfde taksons het die outeur van die publikasie al die ander taksons beskryf.

Die beskrywings behels die latynse frase gepaardgaande met die verwysing na die holotipes en die verspreiding van die takson. Geen verspreidingskaarte word egter voorsien nie. Elkeen van die beskrywings is vergesel van twee foto's waardeur die meeste kenmerke van die taksons duidelik geïllustreer word. By een van die taksons word ook van tekeninge gebruik gemaak. Beskrywings van die taksons in Duits word ook voorsien.

Geeneen van die taksons wat beskryf word, word in Suid-Afrika aangetref nie en daarom is die publikasie vir die deursnee Suid-Afrikaanse plantkundige van relatief min belang. Vir taksonome in die familie Bromeliaceae en spesifiek die betrokke vier genusse, is die werk egter van groot belang.

Die publikasie is in Q1 formaat op duursame glanspapier gedruk en die foto's en tekeninge is van 'n hoë standaard.

P. D. F. Kok